R E P O R T R E S U M E S

ED 011 119 AL 000 217

AN INTRODUCTION TO THE STRUCTURE OF THE CHINESE WRITING SYSTEM.

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PUB DATE 63

EDRS PRICE MF-$0.18 HC-$2.48 62P.

DESCRIPTORS- *LANGUAGE INSTRUCTION, *INSTRUCTIONAL MATERIALS, *CHINESE, WRITTEN LANGUAGE, *ORTHOGRAPHIC SYMBOLS, *STRUCTURAL ANALYSIS, GRAPHEMES, NEW YORK CITY

INSTRUCTIONAL MATERIALS AT THE ELEMENTARY LEVEL OF THE CHINESE WRITING SYSTEM ARE PRESENTED TO TEACH THE STUDENTS (1) HOW CHARACTERS ARE PUT TOGETHER, (2) HOW TO TELL ONE CHARACTER FROM ANOTHER, AND (3) HOW TO ANALYZE NEW CHARACTERS INTO APPROPRIATE CONSTITUENTS FOR PURPOSES OF DICTIONARY SEARCH. THE MATERIALS ARE BASED ON AN IMMEDIATE CONSTITUENT ANALYSIS OF THE CHARACTERS INTO RECURRING PARTIALS AND ARE ORGANIZED INTO UNITS CONTAINING EXPLANATIONS AND DRILLS, BEGINNING WITH THE ULTIMATE CONSTITUENTS OF THE SYSTEM, STROKES, LEADING TO TWO-STROKE COMBINATIONS AND CONSTRUCTS OF HIGHER COMPLEXITY. THE WRITING SYSTEM IS PRESENTED AS A CLOSED SYSTEM, UNRELATED TO THE EXPRESSION SYSTEM OF THE LANGUAGE TO ALLOW EARLY INTRODUCTION OF THE FORMER WITH NO CONFLICT FROM THE LATTER. THE UNITS HAVE BEEN DESIGNED AS OUTSIDE WORK, BUT CLASSROOM EXPLANATION MAY BE REQUIRED FOR CERTAIN DETAILS. (IT)

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AN INTRODUCTION TO THE STRUCTURE

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by

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PREFACE

The aim of the following material is to bring the beginning student of Chinese an awareness of the structure of the writing system, which generally dawns on him only after a year or two of tedious and fragmentary rote memorization. Basically, the student is to be taught three things: 1) how characters are put together (constituent structure, not random lines); 2) how to tell one character from another; 3) how to analyze new characters into appropriate constituents for purposes of dictionary search. The structural features of the writing system are presented in terms of immediate constituent analysis into recurring partials.[1] Starting with the ultimate constituents of the system, Strokes, the student is led through two-Stroke combinations (Simple Bound Graphs) to constructs of higher complexity (Complex Bound Graphs). In passing, the principles of Radical lexicography and such additional structural problems as Crystal Graphs and Look-Alikes are touched upon. At all times the writing system is presented as a closed system, explicable only by its own law and unrelated to the expression system of the language. Pedagogically, such a treatment allows very early introduction of the writing system with no conflict from the expression system, the two parallel channels (eye-hand/ear-mouth) in fact being complimentary to each other.

The materials presented are: a) analysis of the 214 K'ang Hsi Radicals plus the 895 Phonetics of the Soothill-Fenn list[2]; b) the list of 94 characters compiled by Ch'en Ho-ch'in which account for 75% of 554,478 characters of running text from various vernacular sources[3]; and c) Y. R. Chao's illuminating notes in the Mandarin Primer on the radical system[4]. The units have been designed totally as outside work with home assignments to be turned in and

corrected by an instructor. The reader will note, however, that classroom explanation may be required for certain details.

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[1]See Hockett, Charles (ed.): Dictionary of Spoken Chinese (Washington, 1945), pp. 27-28.

[2]See Soothill, W. E.: The Student's Four Thousand Tzu and Pocket Dictionary (Shanghai, 1903), pp. XIV-XXXV; Fenn, C. H.: The Five Thousand Dictionary (Cambridge, Mass., 1960), pp. XV-XIX.

[3]Wei, Ai: Hantzu wenti (Taipei, 1955), pp. 47-48.

[4]Chao, Y. R.: Mandarin Primer (Cambridge, 1957), pp. 63-65.

The Chinese Writing System: Classes of Strokes

The ultimate constituents of all Free Graphs in the Chinese writing system are single lines or Strokes. There are four classes of Strokes: Dots, Straight Lines, Pothooks, and Crooked Lines. Each class will be described below. In studying the strokes the student must fix three things in mind:

a) contour
b) direction
c) variation

Only when these three items are mastered can the student progress fruitfully to the next stage, where familiarity with the above items is assumed.

Class I—Dots

All Free Graphs are written to fill an imaginary rectangle of uniform size. This rectangle may in turn be subdivided into nine similarly shaped smaller rectangles or cells arranged in three rows of three cells each. A Free Graph is written so as to fill the nine cell rectangle, impinging on (but not totally occupying) each of the nine cells. Figure Ia shows the imaginary rectangle with its nine cells: Figure Ib shows a Free Graph against such a grid.

1	2	3
4	5	6
7	8	9

Fig. Ia

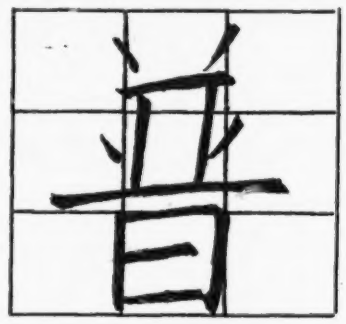

Fig. Ib

A Dot is a short line which may vary in length from 1/3 to 2/3 of the width of any of the nine cells. There are three types of Dots: Vertical, Horizontal, and Skew. The left column in the

following figure illustrates Vertical Dots, the center column Horizontal Dots, and the right column Skew Dots.

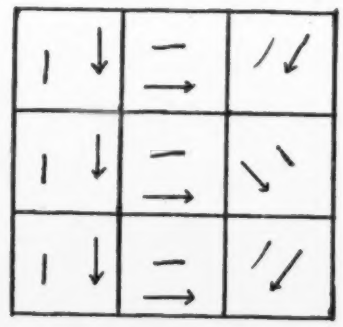

Fig. 2. Dots
(Arrows indicate direction of stroke)

These types of Dots appear in the following Free Graphs:

a) Vertical | in 衆

b) Horizontal — in 言

c) Skew ㇀ in 辛

Drill 1. Row A contains 10 Free Graphs constituted partly of Dots. The same Free Graphs are written in Row B but without their Dots. Supply them.

A. 位 没 罟 受 雨 無 常 業 裏 彪

B. 仁 及 岂 爻 市 無 冂 耒 衷 虎

Drill 2. On the following Free Graphs indicate the direction of Dots (see Fig. 2).

位 没 罟 雨 受 無 常 業

裏 彪

Class II--Straight Lines

Lines--Straight, Pothook, Crooked--generally exceed one cell width in length. Each type of line has two forms: Long and Short (Large and Small for Crooked Lines). Long and Short, however, are relative terms, and must be determined in each instance by the presence of other lines in the same Free Graph. In general the relative length of a line is determined by the lengths of the lines found together with it in the same Simple Bound Graph (q.v.).

Straight Lines may be written Horizontal, Vertical, or Skew. They are written from left to right (Horizontal), from top to bottom (Vertical), or diagonally (Skew). Long lines are generally 2 1/2 cell widths long, short lines 1 1/2 widths. Relative length or shortness of a line is a purely aesthetic consideration unless another line of the same type is found in the same character. Then, the relative length or shortness may be of distinctive difference.

Types of Straight Lines are:

a)	Long Horizontal	as in	→	士
b)	Long Vertical	as in	↓	囚
c)	Long Skew	as in	↙	凶
d)	Short Horizontal	as in	→	土
e)	Short Vertical	as in	↓↓	晶
f)	Short Skew	as in	⤫	兯
g)	Long Reverse Skew	as in	↙	和
h)	Short Reverse Skew	as in	↗	哲

Figure 3 illustrates types of Straight Lines set against the nine cell grid.

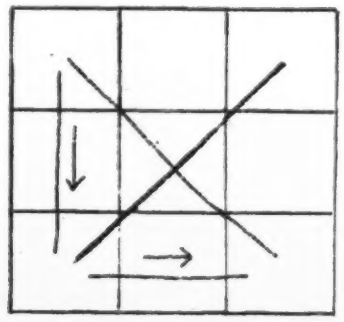

Fig. 3a--Long

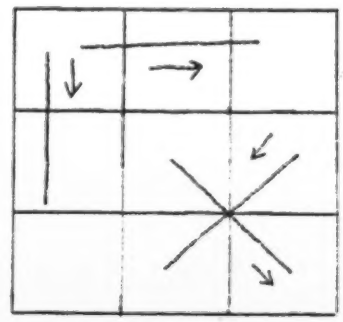

Fig. 3b--Short

Drill 1. Fill in the missing Straight Lines in the Free Graphs in Row B, which are given in their full form in Row A.

A. 因 凶 士 昕 土 岜 井 半 用 木

B. 习 凵 工 圻 工 岜 廾 兰 冂 才

Drill 2. On the large Free Graphs below indicate the direction of strokes you supplied in Drill 1. Under each Free Graph write L or S to indicate whether the stroke is long or short.

a 木 b 凶 c 半 d 土 e 井

f 岜 g 因 h 士 i 用 j 昕

Drill 3. Some of the Free Graphs listed under Drill 2 contain more than one kind of Straight Line. List them after the appropriate letter below. Indicate for each Straight Line its direction (with a direction arrow) and its size (L or S).

a

b

c

d

e

f

g

h

i

j

Class III—Pothooks

Pothooks are Straight Lines terminating in a single, sharply angled, short backstroke. Like Straight Lines, Pothooks may be Long (2 1/2 cell widths) or short (1 1/2 cell widths). Types of Pothooks are:

		Long	Short
a)	Horizontal	→ 軍	→ 輝
b)	Vertical	↓ 和	↓ 黎
c)	Skew	↘ 戈	↘ 銭
d)	Check	↗ 没	↗ 渠
e)	Reverse Skew	↙ 外	↙ 葵

Figure 4 illustrates the types of Pothooks set against the nine cell grid (see p. 11 for variants).

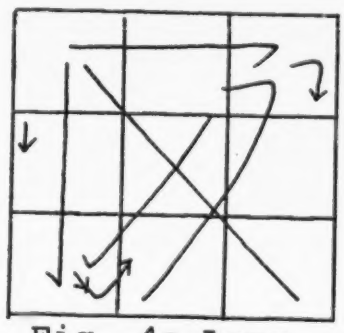

Fig. 4a-Long

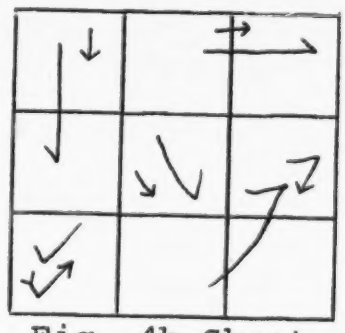

Fig. 4b-Short

Drill 1. Complete the Free Graphs in Row B by adding the Pothooks given in the full form in Row A.

A. 禾 寇 弋 温 銭 兼 発 森 了 字

B. 禾 寇 亠 温 鉦 眞 発 森 了 字

Drill 2. Construct two nine-cell grids and rewrite Figure 4 from memory.

Drill 3. List from memory the three Classes of Strokes studied thus far with all of their types.

Class IV—Crooked Lines

Crooked Lines are Strokes which bend or turn at one or more points. Crooked Lines differ from Pothooks in that both limbs of the angled stroke are more or less of equal length. Crooked Lines are Plain (unhooked) or Hooked. Types of Crooked Lines are:

		Long	as in	Short	as in
a)	Plain Turn	𠃌	凶	𠃌	㔾
b)	Hooked Turn	𠃍	也	𠃍	地
c)	Hook-in Bend	亅	冏	乛	明
d)	Hook-out Bend	乙	飛	乙	翻飛
e)	Plain Cane	丿	飛	丿	翻飛
f)	One jut Bend	𠂉	巡	𠂉	迥
g)	S-Bend	𠂆	吳	𠂆	虞
h)	Little Hook	𠂊	幺	𠂊	絲
i)	Double Hook Bend	𠃎	亟	𠃎	號

Figure 5 illustrates the types the types of Crooked Lines against the nine cell grid (see p. 11 for variants).

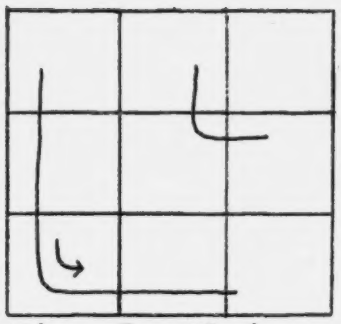

Fig. 5a-Plain Turn

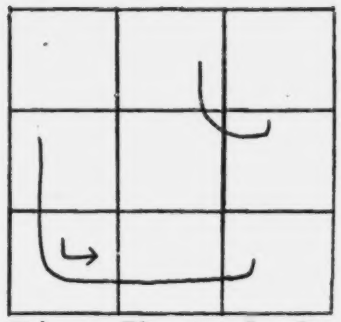

Fig. 5b-Hooked Turn

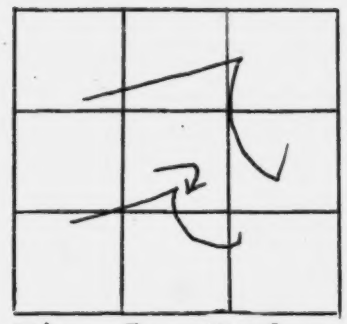

Fig. 5c--Hook-out Turn

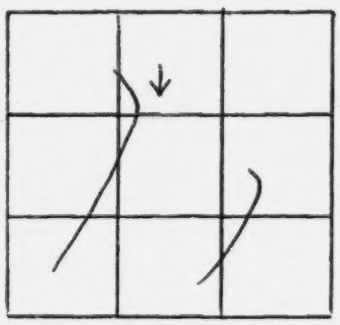

Fig. 5d--Plain Turn

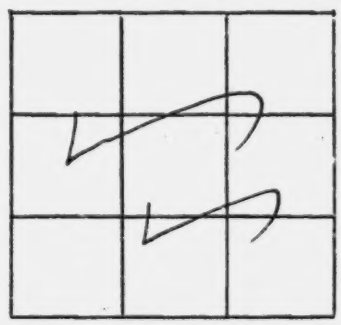

Fig. 5e--S-bend

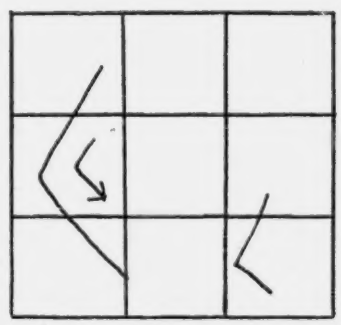

Fig. 5f--One Jut Bend

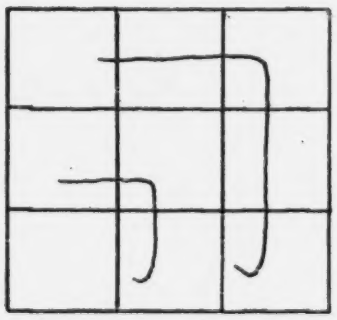

Fig. 5g--Hook-in Bend

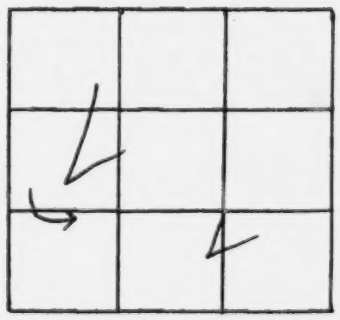

Fig. 5h--Little Hook

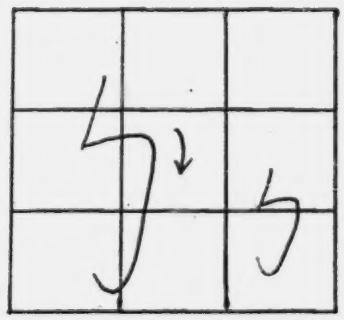

Fig. 5i--Double Hook Bend

Drill 1. Supply Crooked Lines to Graphs in Row B from example given in Row A.

A. 凶 也 飛 亟 幼 司 女 及 飛 巡

B.

Drill 2. Name types of Crooked Lines supplied in Drill 1.

a.

b.

c.

d.

e.

f.

g.

h.

i.

j.

Drill 3. Write from memory and name all Classes and types of Strokes.

Drill 4. Review all previous Drills.

SUMMARY OF CLASSES, TYPES, AND VARIANTS OF STROKES

Class	Type	Variant	
I Dots			
	—		
	′		
	`		
II Straight Lines	|		
	—		
	/		
	\		

Class	Type	Variant				
III Pothooks	⌋	⌋				
	⌐					
	✓	✓				
	↘					
	↗					
IV Crooked Lines	⌊	⌊	⌊			
	⌊	⌊	⌊			
	⌐	⌐	⌐	⌐	⌐	⌐
	⌐					
	⌐					
	⌐					
	⌐					
	⌐					
	⌐					

The Chinese Writing System: Simple Bound Graphs

Free Graphs in the Chinese Writing System are composed of smaller parts or "Constituents" (generally two in number) which recur again and again in different combinations. These Constituents in turn can usually be broken down into two simpler Constituents, much in the same way that a complex molecule can be broken down into simpler ones, and those in turn into molecules simpler still, or into atoms.[1]

The "atoms" of the Chinese Writing System are the Strokes. A Stroke has Contour and Direction. When two Strokes are combined to form a "recurrent partial" (i.e., a Constituent which occurs again and again in a combination with other Constituents), we have a Structure and a Constituent Order. The Structure is the combination itself and the Constituent Order is the sequence in which its Constituents are written.

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[1] The problem is to break down Free Graphs in terms of recurrent partials until the level of strokes is reached. When this is done in terms of traditional 'stroke order' for all Radicals and Phonetics, the structural elements of the writing system at all levels are effectively isolated. Such an analysis underlies the present materials. In all there are 4 classes of Strokes, with 22 Types and 11 additional Variants. Two Stroke possiblities number 56. There are approximately 800 combinations of more than two Strokes. From observation it is noted that most graphs possess a bifurcated structure and that this structure holds true for constituent elements down to the level of the Ultimate Constituents, or Strokes. Graphs are analyzed in terms of the possibility of recurrence of possible segments. For example, the first cut in 招 is into 扌 and 召 ; 打 does not commend itself, since it does not noticeably recur in the corpus and the same is true of 白 . The complete analysis of 招 goes as follows: 招 : 扌, 召 ; 扌 : 丁, 丿 ; 丁 : 一, 亅 ; 召 : 刀, 口 ; 刀 : 刁, 丿 ; 口 : 冂, 一 ; 冂 : 丨, 乛 . This reveals the following Strokes: 丿, 一, 亅, 乛, 丿, 丨 . Two Stroke combinations are: 丁 . 刀 . 口 ; and combinations of larger numbers of Strokes are: 扌, 召, 口 . Where one element is liable to two or more possible breakdowns, the principal of parity is invoked, whereby both Immediate Constituents are assigned as nearly equal a number of strokes as possible.

The least complicated recurrent partial higher than the level of single Strokes is the "Simple Bound Graph"; "Simple" because it can be analyzed directly into two Strokes, and "Bound" because it never, or almost never, acts as a "Free Graph" in the Chinese Writing System.

In studying the Simple Bound Graphs, students should fix two things in mind:

a) Structure of the Simple Bound Graph
b) Constituent Order of the Simple Bound Graph.

In the following charts the first column gives the Structure; the second column gives the First Constituent; the third column gives the Second Constituent superimposed on the First, so that the Structure appears again.

Learn: a) Structure; b) Constituent Order.

Simple Bound Graphs I (8). Write each five times in the spaces provided.

S	C1	C2	1	2	3	4	5		
二	一	二							
𠂇	丿	𠂇							
丷	丶	丷							
丷	丶	丷							
丷	丶	丷							
𠂉	丿	𠂉							
二	丿	二							
𠂉	丿	𠂉							

Simple Bound Graphs II (24). Write each five times in the spaces provided.

マ	フ	マ						
二	一	二						
ラ	丶	ラ						
又	フ	又						
了	フ	了						
十	一	十						
𠂆	一	𠂆						
七	一	七						
才	一	寸						
丁	一	丁						
𠂉	ノ	𠂉						
七	一	七						

Simple Bound Graphs II (con't.)

丂	一	丂					
卩	冂	卩					
又	冂	又					
之	冖	之					
了	冖	了					
了	冖	了					
已	冖	已					
丆	一	丆					
丅	一	丅					
厂	冂	厂					
力	冂	力					
刀	冂	刀					

Simple Bound Graphs III (10). Write each five times in the spaces provided.

ㄒ	ㅣ	ㄒ					
ㄇ	ㅣ	ㄇ					
ㄆ	ㄴ	ㄆ					
ㄔ	ㄱ	ㄔ					
ㄐ	ㅣ	ㄐ					
ㄐ	ㅣ	ㄐ					
ㄐ	ㄴ	ㄐ					
ㄩ	ㄴ	ㄩ					
ㄈ	ㄴ	ㄈ					
ㄟ	ㄴ	ㄟ					

Simple Bound Graphs IV (13). Write each five times in the spaces provided.

ㄙ	ㄟ	ㄙ					
ㄆ	ㄧ	ㄆ					
ㄅ	ㄧ	ㄅ					
ㄦ	ㄧ	ㄦ					
ㄤ	ㄧ	ㄤ					
ㄧ	ㄧ	ㄧ					
ㄟ	ㄧ	ㄟ					
ㄟ	ㄧ	ㄟ					
ㄟ	ㄧ	ㄟ					
ㄟ	ㄧ	ㄟ					
ㄦ	ㄧ	ㄦ					
ㄋ	ㄧ	ㄋ					
ㄠ	ㄟ	ㄠ					

From Simple Bound Graph to Free Graph:

Most graphs in the Chinese Writing System are composed of two Constituents, that is, of structures which occur again and again in contrasting environments to form different Free Graphs. Some of these Constituents are very active, occuring in a large number of graphs. For example, 亻 occurs in 仁 仇 化 仃, and in literally hundreds of others. Some of these Constituents have very little use. In general for Free Graphs the three most frequent types of Constituent distribution are Left-Right, Top-Bottom, and Wrapper-Wrapped.

Left-Right: In graphs of this type one Constituent is on the left and the other on the right, for example: 切 收. In writing, the Left Constituent is written first. There is a vertical cleavage in the character dividing it into two parts. This cleavage we may call the "Constituent Boundary." Everything to the left of the Constituent Boundary belongs to the first Constituent; everything to the right of the Constituent Boundary belongs to the second constituent. For example:

CONSTITUENT BOUNDARY

1 切 2

亻 二

Top-Bottom: In graphs of this type the Constituent Boundary is horizontal. In writing, the Top Constituent is written first. For example:

CONSTITUENT BOUNDARY

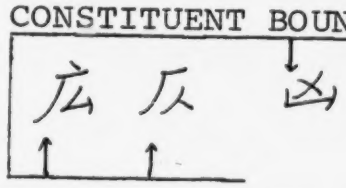
1 1

人 六 冗

勹 八 兀

2 2

Wrapper-Wrapped: In this type of graph, one Constituent is wholly or partially wrapped inside another. The Constituent Boundary runs around the Wrapped Constituent. In general the Wrapper is written first, then the Wrapped Constituent. For example:



Practice writing these graphs in correct Constituent Order (see SBG sheets). Use right margin for practice. Write each graph five times.

Left-Right

仇	亻	九					
仁	亻	二					
刈	乂	刂					
切	七	刀					
收	丩	攵					
双	又	又					

Top-Bottom

予	マ	了					
介	人	丿					
冗	冖	几					
分	八	刀					
及	乃	又					

Wrapper-Wrapped

厂	厂	人					
内	冂	人					
凶	凵	乂					
午	𠂉	十					
历	厂	力					
左	𠂇	厶					
丹	冂	二					

Classify the following ten graphs as to whether they are LR, TB, WW. Indicate how the graphs are written. (No. 0 is an example)

Graph	Class	Constituent 1	Constituent 2
0. 仁	LR	亻	二
1. 半			
2. 匀			
3. 劝			
4. 公			
5. 艺			
6. 允			
7. 仆			
8. 云			
9. 亏			
10. 亢			

Make a list here of all graphs on the previous two pages which share the same First Constituent.

As we have learned, two SBG's can be combined to form a single graph. A single SBG can also be combined with a single stroke to form a graph. The following numbered graphs are important Free Graphs of very high frequency. Learn their structure and constituent order thoroughly. Write each graph five times in the space provided.

	Graph	C1	C1+C2					
1.	一	一	一					
2.	了	𠃌	了					
3.	人	丿	人					
4.	二	一	二					
5.	又	𠃌	又					
6.	十	一	十					
7.	上	卜	上					
8.	小	亅	小					
9.	子	了	子					
10.	也	𠂉	也					
11.	大	𠂇	大					
12.	下	一	下					
13.	之	𠂆	之					
14.	三	一	三					
15.	已	𠃌	已					

Apart from acting as Free Graphs, the above 15, or a number of them at least, act also as Complex Bound Graphs, appearing as Constituents in more complicated Graphs.

Note the Structure and Constituent Order of the following Graphs. Write each Graph five times. On the sample given draw a line indicating the Constituent Boundary:

Graph <u>plus</u> one Stroke:

<u>LR</u>

孔	子	乚					
引	弓	丨					

<u>TB</u>

太	大	一					

<u>WW</u>

尺	尸	丶					

<u>SUPERIMPOSED</u>: This is a <u>new</u> structure. Some Graphs are written in the following way: First, the First Constituent is laid down, then the Second Constituent is <u>written over</u> the First.

丰	三	丰					
弔	弓	弔					

2. Graph plus SBG:

LR

吆	口	幺					
叶	口	十					
叩	口	卩					
叼	口	刁					
叮	口	丁					
奶	女	乃					
奴	女	又					
弘	弓	厶					

TB

召	刀	口					
呂	几	口					
只	口	八					
另	口	力					
古	十	口					
台	厶	口					
孕	乃	子					
岂	山	二					
市	亠	巾					
布	十	巾					

WW

布	十	巾					
可	丁	口					
匝	匚	口					
尼	尸	匕					
尻	尸	九					

S

史	口	乂					
弗	弓	丿					

3. Graph plus Graph

LR

吐	口	土					
地	土	也					
好	女	子					
如	女	口					
弛	弓	也					

TB

吊	口	巾					

Any graph more complex than a Simple Bound Graph is a Complex Bound Graph. A Complex Bound Graph may be constituted in a number of ways. For example:

1) SBG plus Stroke
2) SBG plus SBG
3) CBG plus Stroke

And there are other possibilities, as can readily be surmised. Following is a list of high frequency 4 and 5 Stroke CBG's. Learn Structure and Constituent Order. Practice each Graph five times.

16.	不	一	不					
17.	天	二	天					
18.	日	口	日					
19.	方	亠	方					
20.	心	心	心					
21.	中	口	中					
22.	他	亻	他					
23.	可	丁	可					
24.	以	𠂉	以					
25.	去	土	去					
26.	生	牛	生					
27.	出	屮	出					
28.	此	止	此					
29.	用	冂	用					

As we have seen by now, certain Constituents occur again and again in the composition of Graphs. 亻 and 口 are good examples of this. If we wish to classify Graphs by Structural similarity we can take 亻 or 口 or other high Frequency Constituents as the determining Constituent, and arrange all graphs containing that determining Constituent under it. For example, under 亻 we could place 仇 仁 仆 仃 ; under 口 we could place 叱 叫 叩 叮 叮. If a Graph contains two determining Constituents (as can happen), we could make it a rule that the determining Constituent in First Constituent position count as the determining Constituent for that Graph. Thus, 叼 would be classed 口 , 仁 under 亻 . As a matter of fact, the Chinese long ago worked out a system of 214 determining Constituents, and the general tendency is to classify Graphs under the First Constituent where possible.*

Of the graphs we have written or the Structure of which we have learned, the following are important determining Constituents (or "Radicals" as they are commonly termed). Learn them as such:

刀 力 亻

口 土 女 子 尸 山 巾 弓

手 木 水 火 支 犬 心

---

*More specifically, the tendency is for the Radical to be First Constituent in LR and WW Graphs, and Second Constituent in TB Graphs.

Arrange the following Graphs after their correct Radical (total: 25 Graphs).

叩	尻	弔	呆	必	氷	札	奴	分
孔	地	拏	忠	岐	圭	市	好	什
伍	字	勸	仃	古	尼	布		

Radical	Graphs					Radical	Graphs				
	亻						巾				
	力						弓				
	刀						手				
	口						木				
	土						水				
	女						火				
	子						支				
	尸						犬				
	山						心				

We will recall from the study of Chinese phonology that the third tone has one shape when the third tone syllable is uttered alone and another when a syllable follows. (hǎu/háumǎ) Certain of the Radicals also have one shape when they are written alone and one or more other shapes when they are combined with another Constituent to form a Free Graph. The shape they have when written alone we shall call the Free Shape; the shape they have when they are written in combination with another Constituent we shall call the Bound Shape. Most Radicals have only a Free Shape. The following of those you have studied have a Bound Shape also. Learn the structure of the new Bound Shapes, their Constituent Order, and the Free Shape Radical from which they originate.

Free Shape		Bound Shape		Examples of Bound Shapes in Graphs		
人		亻		仙	仔	
刀		刂		刈	刊	
手		扌		扑	打	
水		氵		汁	汀	
攴		攵		收	攻	
犬		犭		伙	犯	
心		忄 小		怀	怙	恭

Place the following Graphs after their correct Radical (total: 49 Graphs). Note: 刂 and 攵 generally occur in Second Constituent position.

狗	扑	仇	怚	沼	怙	扮
沛	汰	狄	池	别	仕	治
没	怋	抒	忤	攻	沖	汀
仆	汝	剋	他	扮	怩	沁
扜	怀	拈	汁	故	狂	汩
刈	故	攻	仔	收	仍	泥
汕	仙	扞	怡	汜	沏	扔

Radical	Graphs											
人												
刀												
手												
水												
攴												
犬												
心												

Below are nine Radicals of 5 Strokes. Learn Structure, Constituent Order, and Bound Shapes:

Radical	C1	C2	Bound Shape	Samples
疒	广	疒		疚
玉	干	玉	王	玷
田	口	田		畔
皿	冂	皿		盎
目	冂	目		盼

Radical	C1	C2	Bound Shape	Samples
石	厂	石		砆
禾	丿	禾		秈
示	二	示	礻	社
穴	宀	穴		突

The following Graphs all belong to the nine new Radicals just introduced. Place them after their correct Radical (total: 27 Graphs), in the diagram on the following page.

疔	相	私	界	砦	盼	穹	疵	秈
玩	男	社	盍	祝	玷	秃	窈	畦
盅	砌	珪	眈	盃	砆	祀	究	疫

疒									
玉									
田									
目									
石									
禾									
示									
穴									
血									

Classify the same Graphs according to Structure:

TB									
LR									
WW									
S									

Here are high frequency Simple Bound Graphs of 6 and 7 Strokes. Learn Structure and Constituent Order. Write each Graph five times in the space provided.

30.	有	𠂇	有						
31.	全	入	全						
32.	在	才	在						
33.	好	女	好						
34.	多	夕	多						
35.	自	丿	自						
36.	地	土	地						
37.	老	土	老						
38.	如	女	如						
39.	年	𠂉	年						
40.	因	口	因						
41.	我	手	我						
42.	那	𠂤	那						
43.	你	亻	你						
44.	見	目	見						
45.	没	氵	没						
46.	把	才	把						

Here are important new Graphs of 8 and 9 Strokes. Write each new Graph five times in the space provided.

47.	的	白	的					
48.	來	丁	來					
49.	到	至	到					
50.	事	亖	事					
51.	兒	臼	兒					
52.	所	戶	所					
53.	和	禾	和					
54.	於	方	於					
55.	面	𠂇	面					
56.	知	矢	知					
57.	官	宀	官					
58.	是	日	是					
59.	要	西	要					
60.	看	手	看					
61.	很	彳	很					
62.	後	彳	後					
63.	便	亻	便					
64.	前	𠂉	前					

Here are some important Radicals of 7 and 8 Strokes. Learn Structure and Constituent Order. These Radicals do not possess Bound Shapes, except for 足.

Rad-ical	C1	C2	Bound Shape
言	亠	言	
足	口	足	疋
車	亘	車	
門	尸	門	
雨	冂	雨	

Here are twenty Graphs all belonging to the 7 and 8 Stroke Radicals we have just learned. Arrange them after their correct Radical.

踞	軻	鬧	霜	訛
訕	霑	軛	跺	閶
閏	踦	訟	霖	軌
跍	軲	閭	霑	詔

言					
足					
車					
門					
雨					

Here are important new Graphs of 10, 11, and 12 Strokes. Write each one five times in the spaces provided.

65.	們	亻	們					
66.	個	亻	個					
67.	時	日	時					
68.	家	宀	家					
69.	能	月	能					
70.	起	走	起					
71.	這	言	這					
72.	得	彳	得					
73.	國	口	國					
74.	都	者	都					
75.	問	門	問					
76.	從	彳	從					
77.	做	亻	做					
78.	就	京	就					
79.	着	羊	着					
80.	爲	爪	爲					
81.	無	無	無					

The following five Radicals of 9, 10, and 11 Strokes conclude our listing of common Radicals. As before, learn Constituents, Constituent Order, and Bound Shapes.

Rad-ical	C1	C2	Bound Shape	Sam-ples
夏	一	夏		
食	人	食	食	飯
馬	馬	馬		
魚	角	魚		
鳥	鳥	鳥		

Arrange the following Graphs after their correct Radical (total: 20 Graphs).

馴	飼	頂	鰍	鴿	
魯	鳩	馬且	頹	餞	
頑	馱	餓	鴒	鶺	
飯	鮎	鯨	駱	頂	

頁						
食						
馬						
魚						
鳥						

Here are the last of the important high-frequency Graphs, those of 13, 14, 15, 16, and 17 Strokes. Write each Graph five times in the spaces provided. Review all previous numbered Graphs.

82.	道	首	道					
83.	裏	亠	裏					
84.	過	咼	過					
85.	想	相	想					
86.	會	人	會					
87.	話	言	話					
88.	說	言	說					
89.	麼	麻	麼					
90.	種	禾	種					
91.	樣	木	樣					
92.	學	斆	學					
93.	頭	豆	頭					
94.	還	睘	還					

CRYSTAL GRAPHS

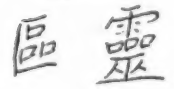
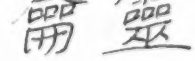
Some Complex Bound Graphs are reduplications, once, twice, or three times over, of a single Simple Bound Graph or Complex Bound Graph. The structure of these Graphs resembles that of certain crystals, the growth of which consists of the ordered reduplication of an initial or basic structure. The Graphs in question are constituted wholly by a reduplicated CBG laid down in an unvarying constituent order. These Graphs we shall term Crystal Graphs. An example of such a Graph is JĪNG which is composed of reduplications of the CBG R̀ .

Members of the class of Crystal Graphs, while numerous and relatively high in Constituent Frequency, are not to be specially noted as such. Rather, the invariable conventions of their Constituent Order are set forth schematically below, and from these the Constituent Order of any Crystal Graph may be unerringly inferred. In the following table, A, B, and C stand for the first, second, and third constituents respectively of a Crystal Graph. No valid instances of four-fold or greater repetition are known.

Two Constituents

Formula	Example	As in
AB		
A B		

Three Constituents

Formula	Example	As in
A BC		
ABC		

CRYSTAL GRAPHS: Drills

Drill 1. The following Graphs are typical Crystal Graphs. Using the ABC notation, show their Constituent Order.

Graph	Constituent Order
畾	
双	
猋	
品	
龍龍	
从	
轟	
竝	
圭	
蟲	

Drill 2. Inspect the following Free Graphs and determine which are valid Crystal Graphs. Check the appropriate column.

Graph	Crystal Graph	Other
冒		
眼		
及		
吕		
兢		
所		
明		
隻		
矛		

Drill 3. Inspect the following Graphs and determine which contain valid Crystal Graphs as Constituents. Check the appropriate column.

Graph	Crystal Graph: Formula (AB, etc.)	Other
封		
疊		
侶		
疆		
婁		
辦		
姦		
嚇		
選		
樂		

LOOK-ALIKES

It often happens that two different Free Graphs written in the same style may so resemble each other as to produce confusion as to which is meant. Such Graphs can be conveniently termed "look-alikes." Look-alikes may be divided into two classes, which we shall term "arithmetical look-alikes" and "geometrical (or topological) look-alikes." In the first class, arithmetical look-alikes, Graphs are distinguished on the basis of total number of strokes. Free Graphs may differ in total number of strokes by one or more strokes. Pairs differing by only one stroke will be illustrated, since these are usually the hardest to distinguish. It should be noted, however, that some pairs differing by two or even more strokes are also hard to tell apart. Examples of arithmetical look-alikes follow; practice writing each pair of Graphs in the spaces provided. The second class, geometrical look-alikes, will be taken up subsequently.

Strokes	FG1	FG2		
2:3	又	又		
3:4	之	之		
4:5	王	玉		
5:6	代	伐		
6:7	合	含		
7:8	住	往		
8:9	亨	享		
9:10	持	特		
10:11	准	淮		
11:12	問	問		

Note: In the examples on the previous page, the distinguishing difference may also be thought of as a difference between the Immediate Constituents, i.e., the IC's of 問 being 門 and 口, those of 間, 門 and 日; the two Graphs share 門 but are contrasted by 日 and 口.

Drill. Write the "odd Graph" in each of the following groups in the space provided.

几	几	凡	
乃	及	乃	
午	干	干	
休	体	休	
侯	侯	候	
捧	棒	捧	
博	傅	傅	
正	止	正	
再	冉	再	
治	治	治	

勾	句	句	
舌	古	舌	
史	史	吏	
味	昧	昧	
哀	衷	哀	
坦	垣	坦	
淮	淮	淮	
埋	埋	理	
太	大	大	
刀	刀	刃	

GEOMETRICAL LOOK-ALIKES

Geometrical look-alikes are pairs of Free Graphs containing the same number of Strokes, all of which are alike in shape and position except one pair (one Stroke in each Free Graph) which distinguishes the two Graphs. This pair of Strokes may differ as to 1) class or type of Stroke, 2) position of Stroke, 3) length of Stroke, 4) degree of closure. This pair we shall call the "minimum pair" (MP).

Type of Stroke. A minimum pair may be composed of two different classes of Strokes or of two different types of the same class.

Different Classes

FG1	FG2	Minimum Pair
刀	刁	Straight Line:Pothook
才	寸	Straight Line:Dot
犬	尤	Straight Line:Crooked Line

Different Types

FG1	FG2	Minimum Pair
天	夭	Horizontal Straight:Skew Straight
刀	乃	Hook-in-bend (Crooked):Double-hook-bend (Crooked)

Position of Stroke. A minimum pair may be composed of the same class and type of Stroke, but differently positioned; the nine-cell grid can be used to identify the crucial positions.

FG1	FG2	Minimum Pair
太	犬	8:3

Length of Stroke. A minimum pair may be composed of the same class and type of Stroke in the same position but of different length.

FG1	FG2	Minimum Pair
未	末	Short:Long
士	土	Long:Short
日	曰	Short:Long

Degree of closure. In some Graphs, otherwise identical in respect to Stroke constituents, contrast is indicated by whether certain figures are left open, half-open, or are closed; intersections count as closed, meetings as open.

FG1	FG2	Minimum Pair
己	巳	Open:Closed
已	己	Half-open:Open
刀	力	Open:Closed
午	牛	Open:Closed
夫	天	Closed:Open

Drill. Write the "odd Graph" in each of the following groups in the space provided.

干	干	于	
未	未	末	
刀	刁	刁	
敗	販	敗	
犬	犬	尤	
已	已	已	
天	夭	夭	
村	材	村	
才	寸	寸	
犬	太	犬	
汎	汎	汎	
沫	沫	沫	
胃	胃	冑	

汗	汙	汙	
戌	戌	戌	
子	子	子	
叶	叫	叶	
母	毋	毋	
弈	弈	奕	
晏	宴	宴	
苗	苗	苗	
辨	辦	辦	
汚	汙	汚	
圯	圮	圯	
汗	汗	汚	

Drill. Write the "odd Graph" in each of the following groups in the space provided. Note: this list derives from a list of characters the Chinese themselves acknowledge as hard to tell apart.

棘	棘	辣	
寇	寇	寇	
今	令	今	
欽	欽	欽	
汎	汎	汎	
捐	損	捐	
壺	壺	壺	
苗	苗	苗	
厄	厄	厄	
商	商	商	
胃	胃	冑	
鳥	鳥	鳥	
場	場	場	

亨	享	享	
丐	丐	丏	
亳	毫	亳	
迥	迴	迥	
帥	師	師	
叟	叟	史	
良	艮	艮	
錫	錫	錫	
崇	崇	祟	
幹	斡	斡	
恕	怒	恕	
剌	剌	剌	

THE FIFTY-SEVEN MOST COMMON RADICALS: "MEANING" AND POSITIONS

Radical	Rank	Chinese Name	"Meaning"	Bound Form(s)	Left	Right	Top	Bottom	Other
亠 tóu	8	--	cover	--	--	--	亦	--	--
人 rén	9	dānlì rén (used for BF1 only)	man	1 人 1 2	你	以人	企	--	來
冫 bīng	15	lyǎng dyǎn shwěr	ice	--	凍	--	--	--	--
刀 dāi	18	lìdāu (BF only)	knife	刂	--	到	--	分	--
力 lì	19	--	strength	--	加	助	--	勞	勝
口 koǔ	30	--	mouth	--	叫	和	吊	古	同
土 tǔ	32	tǐtǔ (BF only)	earth	土	地	--	堯	坐	報

Radical	Rank	Chinese Name	"Meaning"	Bound Form(s)	Left	Right	Top	Bottom	Other
女 nyǔ	38	--	woman	--	好	--	姦	委	脫
宀 myán	40	bǎu gài	roof	--	--	--	定	--	--
尸 shī	44	--	corpse	--	--	--	屋	--	尹
山 shān	46	--	mountain	--	岐	--	岸	岳	嵇,巡
巾 jīn	50	dà jīn páng	napkin, cloth	--	帖	帥	--	布	師
广 yǎn	53	pyānshang	shelter	--	--	--	度	--	--
弓 gūng	57	--	bow	--	強	--	--	彎	弟
彳 chì	60	shwāng lì rén (BF only)	left step	--	得	--	--	--	--

Radical	Rank	Chinese Name	"Meaning"	Bound Form(s)	Left	Right	Top	Bottom	Other
心 syīn	61	shùsyīn (BF only)	heart	忄 小	忙	--	--	忘 恭	必
手 shǒu	64	tǐ shǒu (BF only)	hand	扌	打	--	--	掌	才
攴 pū	66	fānwén (BF only)	tap	攵	--	收	--	--	整
日 ì	72	--	sun	--	時	阳	是	春	晝
木 mù	75	--	wood	--	板	--	李	柴	東
水 shwěi	85	sāndyǎn shwěi (BF only)	water	氵 水 1 2	法	--	--	泉 泰	永
火 hwǒ	86	sždyǎn hwǒ (BF only)	fire	灬	燈		勞	然	灰

Radical	Rank	Chinese Name	"Meaning"	Bound Form(s)	Left	Right	Top	Bottom	Other
犬 chywǎn	94	fǎn chywǎn (BF only)	dog	犭	狗	獸	猋	猋	--
玉 yù	96	yù dzé (BF only)	jade	王	理	--	琴	璧	--
田 tyán	102	--	field	--	略	--	男	當	畫
疒 nì	104	bìng chǎngr	sickness	--	--	--	病	--	--
皿 myǎn	108	--	dish	--	--	--	--	盍	--
目 mù	109	--	eye	罒	眠	相	眾	省	真
石 shf	112	--	stone	--	硬	--	--	磨	--

Radical	Rank	Chinese Name	"Meaning"	Bound Form(s)	Left	Right	Top	Bottom	Other
示 shì	113	--	spirit	礻	福	--	--	禁	--
禾 hé	115	hémù páng	grain	--	種	穌	禿	稟	穀
穴 sywè	116	sywè dż tóu (BF only)	cave	穴	--	--	空	--	--
竹 jú	118	júdż tóu (BF only)	hamboo	𥫱	--	--	等	--	--
糸 mǐ	120	jyǎu sz̄ (BF only)	silk	糸	紅	--	--	緊	縣
肉 ròu	130	ròu ywè (BF only)	meat	月	肚	胡	--	肯	腐
臼 jyòu	134	--	mortar	--	--	--	舅	舊	與

Radical	Rank	Chinese Name	"Meaning"	Bound Form(s)	Left	Right	Top	Bottom	Other
艸 tsǎu	140	tsǎudz tǒu (BF only)	grass	艹	--	--	花	--	匍匐
虫 chúng	142	--	insect	--	蝦段	融虫	蠱	蠻虫	蜀
行 syíng	144	--	walk	--	--	--	--	--	街
衣 yī	145	--	clothing	衤	衫	--	裔	裝	裏
言 yán	149	--	speech	--	記	--	--	警	變
貝 bèi	154	--	valuables	--	賊	--	贔	貴	賴
足 dzú	157	dzú lù (BF only)	foot	𧾷	路	--	--	躉	--
車 chē	159	--	cart	--	輕	--	車專	軍	輿

Radical	Rank	Chinese Name	"Meaning"	Bound Form(s)	Left	Right	Top	Bottom	Other
辶 jwò	162	dzău jī (BF only)	run and stop	辶	送	--	--	--	--
邑 yì	163	yòu ěr dāu (BF only)	city	阝	--	都	--	邕	--
酉 yòu	164	--	liquor	--	酯	酒	--	醫	釁
金 jīn	167	--	metal	--	鋪	--	鑫	鑒	銜
門 mén	169	--	gate	--	--	--	--	--	開
阜 fǒu	170	dzwǒěr dău (BF only)	mound	阝	陳	--	--	--	--
隹 jwēi	172	--	short-tailed bird	--	--	雖	隻	雀	雁

Radical	Rank	Chinese Name	"Meaning"	Bound Form(s)	Left	Right	Top	Bottom	Other
雨 yǔ	173	yǔdz tóu (BF only)	rain	雨	--	--	雲	--	--
頁 yè	181	--	head	--	--	頭	--	--	題
食 shf	184	--	eat	食	飯	--	--	餐	--
馬 mǎ	187	--	horse	--	騎	馮	--	驚	騰
魚 yú	195	--	fish	--	鮮	--	魯	沙魚	--
鳥 nyǎu	196	--	bird	--	鴕	鴨	--	鷹	鷹

Chart augmented from Y.R. Chao: Mandarin Primer (Cambridge, Mass., 1957), pp. 64-65.